Cut Courtesy Westinghouse

Listening with Stethoscope

ENGINEERING • REVIEW

Picking Most Silent Motor

Engineers find a trombone-like stethoscope helpful in tracking down minute noises in capacitor type refrigerator motors. On the test table inside this sound proof room, motors of slightly different electrical and mechanical design are being compared for silence. The single phase capacitor motor is inherently quieter than other types since it has no commutator or brushes and operates on a true polyphase rotating field of constant torque as contrasted to the single phase pulsating torque field found in single phase motors of other types.

Tung Oil

According to a recent Government survey, over thirty-one thousand acres of the southern United States are now planted in tung trees. The tung tree originally came from China which held the monopoly on the tung oil industry until recent years. Our trees came from five seedlings in a cemetery in Tallahassee, Florida. The seedlings were transplanted and although four of them died, the one that lived furnished the seeds for the groves of them that we now have. The tree seems to be very hardy, grows rapidly, and is very profitable in this country. The seeds of the tree yield an oil which is used in the paint and varnish industries.—*Popular Science.*

Shooting Down Airplanes

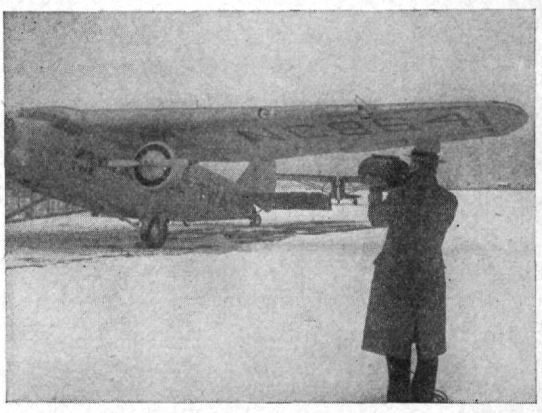
Shooting down airplanes is an activity required at nearly every airport in the country. As a matter of record, it is necessary to shoot them up as well as down.

The "gun," with which this shooting is done, is a small but extremely powerful searchlight and the projectile is a beam of light, either white, red or green. Until this beam of light hits its target, which is an airplane, either in the air or on the ground, just as surely as the marksman hits the bullseye, no flier may land or take off.

Such a unit is required at every airport which is not equipped to radio directly to pilots, by regulations of the Department of Commerce.

The new air traffic "guns" are the latest product of the illuminating engineer's inventive ability. Engineers of the Westinghouse Electric and Manufacturing Company have just developed a new "gun" which is 8½ inches in diameter, 16 inches long, weighs only seven pounds but has a maximum beam candle power of 350,000. Its small size and light weight permit ease of operation and minimum fatigue after an extended period of traffic operation. This is a factor to be considered when it is learned that during the National Air Races in Cleveland, an operator at the Cleveland Airport gave landing and take off signals, using the new "gun," to aircraft at the rate of 300 an hour.

The unit is equipped with two pistol grip handles and is as carefully balanced as the finest rifle, in order that the operator may aim at his target accurately and steadily. The reason that the projector must be aimed, as a gun, is that it "shoots" a beam of light just 12 inches wide. The beam, however, although narrow, is so powerful that



The "Gun" in Operation

it is normally visible 10 miles in the daytime and 15 miles at night. Signals are readily discernible to the pilot of any aircraft that is visible to the airport's traffic director.

The three beams, white, red and green, are changed by pulling the trigger of the searchlight at the front handle. As the pilot of a plane is circling the airport, the traffic manager "shoots" him with a beam. If red, he stays up. If green, he comes in. The same signals are used for taking off. The white beam is used by the traffic director to "spot" objects on the ground for the pilots landing at night.

In "shooting" airplanes, the operator aims at them by means of a sighting tube mounted on top of the projector. This sighting tube is equipped with a peep sight at the rear and cross hairs at the front. The field of view is such that the operator can readily aim the unit and at the same time can see that no other aircraft, other than the one to which he is signalling is in the limits of the beam.

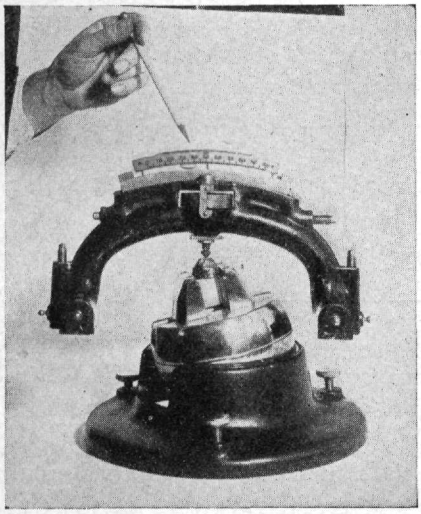
Airports now using these units include the Cleveland Airport; the Port of Newark, N. J.; and the City-County Airport at Pittsburgh.

The photo at the bottom of the opposite page shows Mr. B. A. Glover, airport engineer, Allegheny Municipal Airport, Pittsburgh, demonstrating the new air traffic "gun."

Pendulum Measures Hardness of Metals

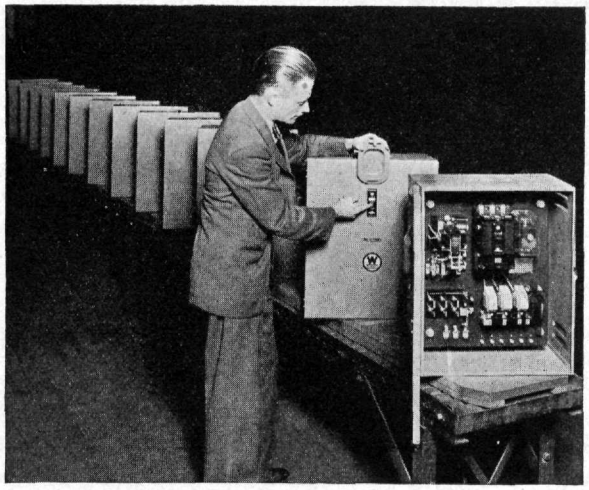
Research engineers determine the hardness of beryllium by means of a Herbert Pendulum. The pendulum hardness tester is also used with thin sheets of metal, very brittle metals, case-hardened metals or other materials that cannot stand the rigors of hardness testing by the Brinnell or sceleroscope methods.

A tiny spherical steel ball, 1/25 inch in diameter, supports the heavy pendulum upon the test specimen. The spherical ball sinks farther into soft metals than hard metals, lessening the amount of the swing but increasing the time required for it. An air bubble in the curved tube on top of the pendulum indicates on the scale above the tube the extent of the pendulum's swing, and from this data the specimen's hardness is computed.



The Herbert Pendulum

Westinghouse



De-Ion Controllers

Largest Post Office

The mail handling equipment at the Chicago Post Office will require 730 electric motors and controllers arranged in a very highly developed interlocking system. The above illustration shows the first of these controllers being manufactured at the East Pittsburgh Works of the Westinghouse Electric and Manufacturing Company. Each unit consists of a De-ion Breaker, magnetic contactors and relays. This will be the largest postoffice in the world, being 800 feet long, 350 feet wide, and 200 feet high, containing 50 acres of floor space, and will cost approximately $21,000,000.

TC-13 Nears Completion

THE TC-13 will soon be ready for delivery to the United States Air Corps for use in coastal patrol work according to information released by the Goodyear-Zepplin Corporation of Akron. This ship, said to be the largest of its type in the United States, is 232 feet long, 54 feet in diameter, and 69 feet high. It has a capacity of 360,000 cubic feet of helium and will give a gross lift of 22,300 pounds. At present, the only ship of this type that approaches it, has a volume of 200,000 cubic feet.

Regardless of its size, a greater maneuverability will be possible because of the five control surfaces instead of the conventional four now used. The fuel tanks of 900 to 1300 gallons capacity as well as the water and storage tanks can be dropped by the pilot at his discretion to provide a greater buoyance in times of emergency. The corrugated metal car is supported by cables fastened from the inside top of the gas compartment and provides complete accommodation for a crew of eight, consisting of three pilots, two mechanics, a navigator, radio operator, and bomber. The ship also boasts of a new type of subcloud car which can be lowered from a winch over a thousand feet for observation, and telephone information to the ship hidden in the clouds above.—*Aviation.*

How Jig Saw Puzzles Are Made By The Million

Jig-saw puzzles are the latest craze in America. They have replaced the cross-word puzzle, bridge, and many other pastimes. It is interesting how they make so many of these puzzles.

On a block of wood a draftsman draws the outline of the irregular pieces that will make the jig-saw puzzle. Then a jig-saw is used to cut out the pieces according to the pattern drawn. The block leaves the machine with all of the pieces in place. Next steel knives are set in the design of the puzzle. These blades cut the puzzle into bits as it is when you sit down to it. After the cutting blades or knives are in place, the die goes to the press, a machine weighing thirty tons. This press stamps out the puzzles. The knives do not cut clear through the cardboard but leave the pieces still clinging together. The puzzles are then sent to a group of girls who break the puzzles up into their pieces and dump them into a hopper where they are collected and boxed for delivery to distributing agents.

Something New in Electrolysis

A new method of electrolysis for obtaining such rare metals as uranium, thorium, and tantalum in the pure state has been developed by Dr. Frank H. Driggs and his associates in the metallurgical research laboratories of the Westinghouse Lamp Company. Being continuous and therefore cheaper, this new process is expected to make rare metals available in larger quantities and at cheaper prices, thereby extending their industrial uses either separately or as alloys.

In this new process, a cathode is inserted in a liquid bath containing equal parts of sodium and potassium chloride to which has been added a quantity of potassium thorium fluoride when the metal thorium is desired. After powdered thorium has collected to a thickness of about one inch on the cathode, it is removed and replaced immediately with another cathode, the feature which makes this process continuous. It is not necessary to destroy the entire bath in order to obtain the metal deposits as in other processes.

High Speed Oxidation

Rare metals in the powdered state oxidize so rapidly at room temperature that extreme care must be exercised in this process else the powdered metal will "go up in smoke."

As the cathode is removed from the liquid bath, the salty solution clinging to it temporarily protects it from oxidation. When the solution is washed away, however, the powder must be preserved in an atmosphere of ether or in a vacuum. After it is pressed into bars, the rare metal does not oxidize at room temperature and can be handled freely.

To get these bars of rare metals in the molten or ductile state they are placed inside induction coils of vacuum induction bottles and subjected to high temperatures until they are suitable for drawing and working into alloys.

Now that rare metals are more readily available, their field of application in industry is broadened considerably. Perhaps the most practical application of rare metals to date is in gaseous tubes such as those used in electric signs, radio tubes, and for some applications of interior illumination. Being radio active, uranium and thorium as electrodes, cause gases to ionize at room temperature and thereby permit lower starting voltages.

New Method of De-Airing and Fluxing

George A. Loomis, of the Engineering Experiment Station, after three years' research is introducing new methods of de-airing and fluxing to the tableware industry in Ohio.

The two processes developed remove the air in clay used for both brick and tableware, providing a firmer texture, and provide a method for mixing with other materials.

Mixing makes possible the production of whitewash at a lower firing point, thus bringing an economy in fuel cost. The de-airing process is already being used commercially.

Plates made by Loomis are tested for workability, dry strength, shrinkage in drying and firing, absorption, warpage, chipping and impact resistance, quecking and delayed cracking of the glazed surface.

World's Largest Water Tunnel

The largest tunnel in the world constructed to carry water is nearing completion. When finished, it will carry a billion gallons of water a day to New York City homes and factories. This tunnel has been under construction for the last three years far beneath the feet of millions. Workmen have blasted through solid rock, day and night, without disturbing the surface dwellers. Over 8,000,000 pounds of dynamite have been used. The tunnel will be twenty miles in length and fourteen feet in diameter when completed. The old tunnel built fifteen years ago has long been overtaxed.—*Popular Science.*

"It is my conviction," said F. A. Merrick, President of the Westinghouse Electric and Manufacturing Company, "that the work of the Committee on Industrial Rehabilitation, together with other forces at work, will in a short time provide the stimulus to reestablish individual purchasing power, expand credit, and return many of our unemployed to gainful occupation."

It takes *resourcefulness*...

Time and again, Bell System engineers have demonstrated their pioneering bent in working out unusual telephone construction problems.

For example, they laid a huge conduit under the Harlem River. They dredged a trench in the river bottom, lowered enormous sections of iron pipe, sent down divers to join the sections, encased the finished tube in concrete. Through this they ran telephone cables forming one of New York's main lines of communication. Across the Gila River in Arizona they constructed a catenary span 2373 feet long. To bridge oceans, they developed radio telephony. They have built telephone lines over mountains, across deserts, through swamps.

Their resourcefulness in getting through, over or under natural barriers makes possible telephone service that is practically world wide in reach.

BELL SYSTEM

SAY "HELLO" TO MOTHER AND DAD
...RATES ARE LOWEST AFTER 8:30 P. M.